



SLOVENSKI STANDARD

oSIST prEN 16448-2:2012

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Varovalna obleka - Neprebojno oblačilo - 2. del: Odpornost proti izstrelkom, zahteve in preskusne metode

Protective Clothing - Body Armour - Part 2: Bullet resistance, requirements and test methods

Schutzkleidung - Körperschutz - Teil 2: Ballistische Schutzwesten - Anforderungen und Prüfverfahren

Vêtements de protection - Protection corporelle - Partie 2: Gilets pare-balles - Exigences et méthodes d'essai

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13.340.10 Varovalna obleka Protective clothing

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Protective Clothing - Body Armour - Part 2: Bullet resistance, requirements and test methods

Vêtements de protection - Protection corporelle - Partie 2:
Gilets pare-balles - Exigences et méthodes d'essai

Schutzkleidung - Körperschutz - Teil 2: Ballistische
Schutzwesten - Anforderungen und Prüfverfahren

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If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Foreword

This document (prEN 16448-2) has been prepared by Technical Committee CEN/TC “Protective clothing including hand and arm protection and life jackets”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This standard consists of the following Parts:

EN 16448-1 Protective clothing — Body armour — Part 1: General requirements.

EN 16448-2 Protective clothing — Body armour — Part 2: Bullet resistance — Requirements and test methods

EN 16448-3 Protective clothing — Body armour — Part 3: Knife stab resistance — Requirements and test methods

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Introduction

Compliance with this part of the Standard (prEN 16448-2) does not imply that the body armour provides resistance against knife stabs, or stabs by needles or spikes. Testing according to other parts of this Standard is necessary to provide this information.

Attention is drawn to other parts of this standard:

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1 Scope

Part 2 of this of European Standard contains the performance requirements and test methods for determining the resistance of body armour to impacts by bullets from handguns (pistols and revolvers), and rifles.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16448-1, *Protective clothing — Body armour — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General ballistic terms

3.1.1

impact velocity

velocity of the bullet measured at the specified distance from the strike face of the test specimen

3.1.2

point of impact

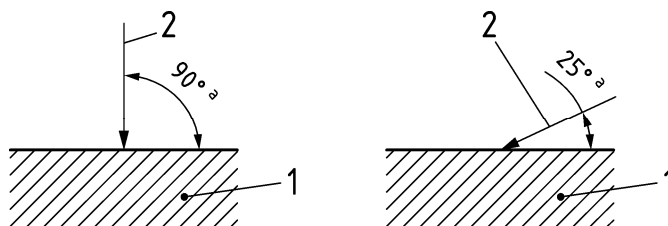
Specified point on test specimen where the projectile is intended to hit the test specimen

3.1.3

angle of impact

is the angle between the line-of-fire of the threat and the line which is parallel to the surface of the sample on the point of impact

Note 1 to entry: A perpendicular angle of impact would be 90° (see Figure 1).



Key

- 1 specimen
- 2 line-of-fire

Figure 1 — Angle of impact

3.1.4

penetration

passage of an object into a test specimen

Note 1 to entry: An object can penetrate into a test specimen without perforating it.

3.1.5**perforation**

passage of an object through all layers of a material, for example through a test specimen

Note 1 to entry: A perforation is observed when a bullet, any part of a bullet, any other material or fragments has passed through the specimen or is visible from the body side

3.1.6**contact shot**

test shot made with the muzzle of the weapon pressed towards the specimen.

3.1.7**backing material**

defined material that is placed behind a test specimen during projectile, test blade, and test spike impact testing

3.1.8**indentation diameter**

maximum diameter of the indentation made in the backing material in an impact test.

3.1.9**indentation depth**

maximum depth of the indentation made in the backing material in an impact test.

Note 1 to entry: The depth is measured relative to the original front surface of the backing material as indicated by the level of surrounding undisturbed material

3.1.10**shot distance**

distance between muzzle of weapon and the point at which the bullet hits the test specimen

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3.1.11**distance between two impacts**

distance between the points of two impacts on the same test specimen

3.1.12**distance between impact and edge**

distance between one impact point and the nearest edge of the test specimen

3.1.13**overlapping design**

design of body armour where parts of the body armour are overlapping other parts, for example like in an old fashioned knights armour.

3.2 Terms, definitions and abbreviated terms for projectiles**3.2.1****solid projectiles****SOLID**

projectile made from a homogeneous material, e.g. lead, brass, copper alloy without projectile coat

3.2.2**Full metal jacketed projectile****FMJ**

projectile made from a deformable material and jacketed by a hard metal

Note 1 to entry: The core could be made of for example lead or iron, and the jacket can be made of for example coated steel or copper alloy.

prEN 16448-2:2012 (E)**3.2.3****Armour piercing projectile****AP**

projectiles with a hard non-deforming core or core component and a jacket.

4 Requirements, classifications and test conditions**4.1 General**

After being completely tested according to section 6 in this standard, the following requirements shall be fulfilled:

- a) No perforation as defined in section 6.13 shall be detected.
- b) The indentation depths in the backing material after each shot shall be less than the maximum allowed indentation depth as defined in section 4.2.
- c) No ricochet shall be observed, as described in section 6.13.
- d) No bullet shall be observed slipping outside the specimen from the side, as described in section 6.13.
- e) If a rigid panel is incorporated in the design, no part of that panel, i.e. pieces of metal or ceramic plate, shall be found in the backing material.

Bullet resistant body armour shall also meet the requirements described in Part 1 of this standard.

NOTE Compliance with Parts 1 and 2 of the Standard does not imply that the body armour provides stab protection. Compliance with Parts 1 and 3 of this standard is necessary for stab protection. For dual-purpose body armour i.e. Ballistic + Stab, compliance with Parts 1, 2 and 3 is required.

4.2 Permitted indentation depth in backing material

For any shot, the indentation in the backing material shall not exceed 22 mm + the average deformation value determined during the backing material plasticity calibration.

NOTE Since the maximum allowed spread in the plasticity calibration value is 20 ± 2 mm, the actual limit in indentation value will vary between 40 and 44 mm depending on the actual plasticity of the backing material.

4.3 Test ammunition to be used for different protection levels

When testing a body armour according to this document, depending on the protection class, ammunition, shooting distance and impact velocity according to the following specification shall be used.

Table 1 — Specification of test ammunition

Class	Ammunition							Test Conditions	
	Caliber (mm)	Type	Mass (g)	Producer	Model	Mfg code	Bullet description	Impact velocity (m/s)	Distance (m)
G1	9x19	FMJ	8,0	RUAG	DM41	#21258 97	Tin coated steel jacket, lead core	415 ± 10	5 + 0,5
G2	9x19	SOLID	7,0	RUAG	Penetrator	#21260 01	Solid brass bullet	405 ± 10	5 + 0,5
G3	7,62x51	FMJ	9,45	MEN	DM41	#23009 2	Steel jacket, lead core	830 ± 10	10 ± 0,5
	7,62x51	FMJ/AP	9,7	MEN	HPC	#23037 4	NATO specified armour piercing	820 ± 10	10 ± 0,5

NOTE 1 The use of particular reference bullets implies a full specification of the bullets (e.g. DAG DM41 fully defines a particular bullet).

NOTE 2 Information on how to measure the distance can be found in section 6.8.

NOTE 3 The distance is picked only to allow for the bullet to stabilise in the air, and the accuracy shall allow for testing on curved specimens without moving the target between shots. The important parameter for defining the impact energy, is the impact velocity in the table above. The retardation of the bullet over a distance of one meter (the accuracy of the distance) is not considered significant.

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4.4 Test conditions and Test Specimen/samples

If protection in levels G2, G3 and G4 is achieved by adding extra insert plates onto a combination of carrier and body armour with basic protection, then:

- the tests for those classes shall be made with the insert plates mounted on the carrier/basic body armour;
- the carrier/basic body armour itself shall pass a full test for protection class G1.

4.5 Number of test shots to make for different protection levels and features

4.5.1 Basic tests

4.5.1.1 Regular basic test

When testing a Body Armour according to this document, depending on the protection class and the type of test to be performed, the following number of shots shall be made.

Table 2 — Specification of number of shots per bullet type, protection level and test type.

Test condition	Clause ref	Number of shots/bullet type			
		Class G1	Class G2	Class G3	Class G4
Angle: 90° Temperature: +20 °C		3+1	3	3	3
Angle: 25° Temperature: +20 °C		3	3	3	3
Contact shot Temperature: +20 °C		3	0	0	0
Angle: 90° Temperature +40 °C		3	3	3	3
Angle: 90° Temperature: +70 °C		3	3	3	3
Angle: 90° Temperature: -20 °C		3	3	3	3
Lowest number of specimens per class necessary		6	5	15	5

NOTE The table lists the number of test shots per bullet type. For some protection classes test shots might be prescribed with more than one bullet type, and the number of total shots will then increase.

If a body armour shall offer both bullet resistance as well as stab resistance simultaneously, a non-detachable construction shall be subjected to both a ballistic test according to this document and a stab test according to part 3 of this standard.

The ballistic tests and the stab tests are performed on different test specimens.

If another shooting angle than 25° could be expected to be more severe for the body armour, then that angle should be tested with three additional shots at +20 °C.

4.5.1.2 Shatter gap test

For each bullet tested, an additional test shall be made with six shots at +20 °C and a bullet velocity 100 m/s slower than the nominal bullet velocity for that bullet

4.5.1.3 Edge test

For body armour tested to level G1 an additional impact (edge impact) shall be shot at a distance to the edge of the specimen of 30 ± 5 mm and at least 75 mm from the corner.

NOTE As described in 6.10, the indentation depth in the backing material is not measured for this shot.